

Core Video Metadata Profile

Version 1.0

14 March 1997

Contents

1. INTRODUCTION	1
1.1 Background	1
1.2 Document Purpose	1
1.3 Document Scope	2
2. Applicable Documents	2
3. Core Video Metadata Set	3
3.1 Relationship to USIGS Metadata	3
3.2 Table of Core Video Metadata Elements	3
3.3 Elements Mapped to the NIMA Metadata Model	11
4. Acronyms and Abbreviations	12

1. INTRODUCTION

1.1 Background

The Central Imagery Office (CIO)-chaired Video Working Group (VWG) created the Video Metadata Group (VMG) to identify metadata for efficient storage and access of video data. As a result of increased interest in video imagery in the Department of Defense and Intelligence (DoD/IC) communities, VMG membership is open to academia, commercial industry, and government.

The VWG tasked the VMG to develop and coordinate a community-wide common set of video metadata, compliant with existing metadata standards, primarily the United States Imagery System (USIS) Standards Profile for Imagery Archives (SPIA). In cases where no metadata elements exist, new ones will be created, coordinated with the community, and added to the standards via the appropriate request for change (RFC) process. In October 1996 the CIO was integrated into the National Imagery and Mapping Agency with several other imagery and geospatial oriented organizations. The enterprise architecture providing the services associated with NIMA business processes is now the United States Imagery and Geospatial Information System (USIGS). There will be a transition period to update CIO and DMA and related organizations' documentation to NIMA documents.

Quantity, format, and precision boundaries will be placed on the video metadata collective core set based on the need for community-wide commonality, migration strategies, current commercial video equipment technical constraints, and standards. As the intelligence and commercial communities migrate from analog to digital video, it is necessary to ensure the flexibility to extend the video metadata set for simplified data handling in the digital environment.

Video metadata development will occur on different scales. Today's operational needs include video archiving, exploitation, and dissemination; mapping and co-registration; and community-wide interoperability. Mid-term community requirements will identify the need for increased quality, accuracy, and additional video tools. Long term requirements must address seamless insertion into the imagery and geospatial chain, including tasking, collection, exploitation, reporting, product generation, and engineering studies and evaluations.

1.2 Document Purpose

This standard is intended to define the core set of metadata that must be present, when feasible, in analog and digital video signals. Supporting current "analog video" with a coordinated set of metadata (for near term implementation) was a significant factor in the choosing of specific data elements. However, this standard also provides a stable foundation for metadata supporting digital video both in the near and far term. Discussion of specific technical issues is beyond the scope of this document; refer to the VWG Technical Report, *USIS Video Imagery Technical Information*, for further details.

1.3 Document Scope

This document will apply to all programs that collect, exploit, store, or otherwise handle video. Video teleconferencing (VTC) applications are specifically excluded. It provides guidance to developing programs and will prove useful during migration of existing programs.

2. APPLICABLE DOCUMENTS

The documents listed below are either referenced standards or resources containing additional information.

United States Imagery and Geospatial Information System (USIGS) Standards Profile for Imagery Access (SPIA), NSPIA, 14 March 1997

National Imagery Transmission Format for the National Imagery Transmission Format Standard, MIL-STD-2500A, Version 2.0, 12 October 1994 and Notice 1, 7 February 1997

National Imagery Transmission Format Standard Profile for Imagery Archive Extensions (NITFS PIAE), Version 2.0, 25 April 1996

Airborne Synthetic Aperture Radar (SAR) Support Data Extensions (SDE) for the National Imagery Transmission Format (NITF), Version 2.0, of the National Imagery Transmission Format Standards, RASG-9606-001, 20 May 1996

Video Working Group USIS Video Imagery Technical Information Technical Report, VWG/TR-001-96, Version 1.0, 22 November 1996
United States Imagery System Directive 2-1.1, Exploitation and Reporting Structure (EARS-1.1): Electronic Reporting, CIO-3P-005-95, 9 February 1995, Change Notice 02

The Digital Geographic Information Exchange Standard (DIGEST), Edition 1.2, January 1994

DoD Geospatial Data Standardization Project Report, Volume 3, Geospatial Metadata, 16 September 1996

3. CORE VIDEO METADATA SET

3.1 *Relationship to USIGS Metadata*

The VMG primarily used the existing SPIA as stated in section 1.1 and will coordinate addition of appropriate elements as shown in table 3-1. Table 3-2 depicts the elements which already existed in the SPIA version 1.0. Table 3-3 and Table 3-4 represent those elements approved by the Imagery Standards Management Committee/Geospatial Standards Management Committee (ISMC/GSMC) on 14 March 1997 to be added to the SPIA. The Core Video Metadata Profile appears in the USIGS SPIA, dated 14 March 1997, as appendix III.

As part of the larger data standardization effort many of the elements correlate with data elements named and defined in the NIMA Metadata Model (*DoD Geospatial Data Standardization Project Report*, Volume 3, Geospatial Metadata). Those mappings are shown in table 3-5. As the NIMA Metadata Model is further coordinated and the Data Standardization is implemented, element titles may be modified with current descriptions and domain values remaining valid.

3.2 *Table of Core Video Metadata Elements*

The following table presents the data elements in alphabetical order. Attention must be given various elements which are connected, functionally equivalent, or extend the future processing options of products. Notes # 1, 2, 3, are applicable to specific elements as labeled in this table and repeated in section 3.3 which categorizes the elements.

Note 1: Sensor position may be expressed by several functionally equivalent element sets. SENSOR X DIMENSION, SENSOR Y DIMENSION, and SENSOR Z DIMENSION (ECEF Cartesian coordinates) or SENSOR ALTITUDE, SENSOR LATITUDE, and SENSOR LONGITUDE (decimal degrees) or SENSOR ALTITUDE and SENSOR LATLONG (degrees, minutes, seconds).

Note 2: FOCAL LENGTH and FIELD OF VIEW have some functionally equivalent characteristics. FOCAL LENGTH or FIELD OF VIEW, SENSOR ROLL ANGLE, ANGLE TO NORTH, and sensor depression angle (the inverse of OBLIQUITY ANGLE)) are used to reconstruct a trapezoid defining the area covered by the video frame.

Note 3: The geographical centerpoint of a video frame may be defined by FRAME CENTER LATITUDE and FRAME CENTER LONGITUDE (decimal degrees) or FRAME CENTER LATLONG (degrees, minutes, seconds).

Table 3-1

In Existing SPIA?	Element Name	Short Name	Char Type	Length	Description/Comments	Repeating?	Domain
Y	ANGLE TO NORTH	ANGLETO NORTH	N	3	Angle in degrees from the first row of the image to true north (See Note 2)	Y	000 to 359
Y	CLASSIFICATION	CLASS	A	1	Indicates the classification level of the product	Y	T Top Secret S Secret C Confidential R Restricted U Unclassified
Y	DATUM	DATUM	A	3	Identifies the map datum used to derive the target coordinates (UTM or GEO)	N	Domain values as listed in the DDDS for data element Horizontal-Reference-Datum-Code.
N <i>add to SPIA</i>	FIELD OF VIEW	FOV	N	3	Sensor field of view in degrees (See Note 2)	Y	0 to 180 degrees
N <i>add to SPIA</i>	FOCAL LENGTH	FOCLNGTH	N	5	Focal length of the lens at time of collection measured in millimeters (See Note 2)	Y	nnnnnnnnnnnnnnnn (fixed point) (TBR) NNNN.N in millimeters for video
N <i>add to SPIA</i>	FRAME CENTER LATITUDE	FRCNTLAT	N	9	Specifies the video frame center point geographic location in decimal degrees of latitude. (See Note 3)	Y	± dd.ddddd - where “+” is northern hemisphere and “-” is southern hemisphere

In Existing SPIA?	Element Name	Short Name	Char Type	Length	Description/Comments	Repeating?	Domain
N <i>add to SPIA</i>	FRAME CENTER LATLONG	FRCNTLTG	A/N	15	Specifies a video frame center point geographic location in latitude and longitude (See Note 3).	Y	ddmmssXdddmmssY dd degrees latitude ddd degrees longitude mm minutes ss seconds X N for north S for south Y E for east W for west
N <i>add to SPIA</i>	FRAME CENTER LONGITUDE	FRCNTLON	N	10	Specifies the video frame center point geographic location in decimal degrees of longitude. (See Note 3)	Y	± ddd.ddddd - where "+" is eastern hemisphere and "-" is western hemisphere
N <i>add to SPIA</i>	FRAME POSITIONAL ACCURACY	FRPSNACC	N	4	Accuracy of FRAME CENTER coordinates as a Circular Error Probable (CEP) (50%)..	y	NNNN in meters
Y <i>update SPIA</i>	IMAGE CATEGORY	ICAT	A	8	Identifies the specific category of imagery (often revealing the nature of the collector or intended use)	Y	As defined in NITF v2.0, plus: SL Side-Looking Radar TI Thermal Infrared FL Forward Looking Infrared RD Radar EO Electro-optical OP Optical HR High Resolution Radar HS Hyperspectral <u>VIDEO</u> <u>Electro-optical Video</u> <u>VDOP</u> <u>Optical Video</u> <u>VDTI</u> <u>Thermal Infrared Video</u> <u>VDFL</u> <u>Forward Looking Infrared Video</u> CP Color Frame Photography BP Black/White Frame Photography

In Existing SPIA?	Element Name	Short Name	Char Type	Length	Description/Comments	Repeating?	Domain
Y	IMAGE COORDINATE SYSTEM	ICORDS	A	1	Indicates the geo-referenced coordinate system for the image	Y	U UTM D Decimal Degrees (WGS 84) G Geodetic C Geocentric N None
Y	MISSION NUMBER	MSNNUM	A/N	1-7	Identifies the mission number assigned to the mission	N	As defined by EARS Vol 1.1
Y	OBLIQUITY ANGLE	OBLANGLE	N	5	Obliquity angle of image expressed in degrees (See Note 2)	Y	00.00 to 90.00 The inverse of sensor depression angle
N <i>add to SPIA</i>	PRODUCT START TIME	PRODSTRT	A/N	14	Video product start date and time in UTC. Accurate to within 1 second of the acquisition of the first line of the first image	N	YYYYMMDDHHMMSS yyyy year mm month dd day hh hour mm minute ss second
Y	PROJECT ID CODE	PROJID	A	2	Identifies collection platform project identifier code	Y	As defined by EARS Vol 1.1
N <i>add to SPIA</i>	SENSOR ALTITUDE	SENSALT	N	5	Altitude of sensor as measured from Mean Sea Level (MSL) expressed in feet (See Note 1)	Y	NNNNN
N <i>add to SPIA</i>	SENSOR LATITUDE	SENSLAT	N	9	Specifies a sensor's geographic location in decimal degrees of latitude (See Note 1)	Y	± dd.ddddd - where "+" is northern hemisphere and "-" is southern hemisphere

In Existing SPIA?	Element Name	Short Name	Char Type	Length	Description/Comments	Repeating?	Domain
N <i>add to SPIA</i>	SENSOR LATLON	SENSLTG	A/N	15	Specifies a sensor's geographic location in degrees, minutes, seconds of latitude and longitude (See Note 1)	Y	ddmmssXdddmmssY <i>dd degrees latitude</i> <i>ddd degrees longitude</i> <i>mm minutes</i> <i>ss seconds</i> <i>X N for north</i> <i> S for south</i> <i>Y E for east</i> <i> W for west</i>
N <i>add to SPIA</i>	SENSOR LONGITUDE	SENSLON	N	10	Specifies a sensor's geographic location in decimal degrees of longitude (See Note 1)	Y	± ddd.ddddd - where "+" is eastern hemisphere and "-" is western hemisphere
N <i>add to SPIA</i>	SENSOR MODEL	SENSMODEL	A/N	4	Identifies the name of the sensor model used in capturing the image	Y	TBD
Y	SENSOR NAME	SENSNAME	A/N	18	Identifies the name of the sensor used in capturing the image	Y	TBD
N <i>add to SPIA</i>	SENSOR ROLL ANGLE	SENSRANG	N	4	Specifies the roll angle of the sensor (See Note 2).	Y	± 180 in degrees
N <i>add to SPIA</i>	SENSOR X DIMENSION	SENSXDMN	N	13	Specifies the sensor location along the x axis in Earth Centered, Earth Fixed (ECEF) Cartesian coordinates (See Note 1)	Y	± NNNNNNNN.NNN in meters
N <i>add to SPIA</i>	SENSOR Y DIMENSION	SENSYDMN	N	13	Specifies the sensor location along the y axis in Earth Centered, Earth Fixed (ECEF) Cartesian coordinates (See Note 1)	Y	± NNNNNNNN.NNN in meters

In Existing SPIA?	Element Name	Short Name	Char Type	Length	Description/Comments	Repeating?	Domain
N <i>add to SPIA</i>	SENSOR Z DIMENSION	SENSZDMN	N	13	Specifies the sensor location along the z axis in Earth Centered, Earth Fixed (ECEF) Cartesian coordinates (See Note 1)	Y	± NNNNNNNN.NNN in meters
N <i>add to SPIA</i>	SLANT RANGE	SLRNGE	N	5	Distance from the sensor to the image center point on ground expressed in feet	Y	NNNNN
N <i>add to SPIA</i>	VIDEO TIME STAMP	VTMSTP	A/N	8	Indicates the time the video was captured and the related frame number.	Y	Per ANSI/SMPTE 12M-1995 HHMMSSFF <i>hh hour</i> <i>mm minute</i> <i>ss second</i> <i>ff unique field associated down to frame or specific instance of hhmmss</i>

The data elements below existed in SPIA version 1.0.

Table 3-2

Angle to North
Classification
Datum
Image Category
Image Coordinate System
Mission Number
Obliquity Angle
Project ID Code
Sensor Name

Data elements below are various ways to depict locations. Two locations needed for video are for the sensor and the center of the video frame. The IMAGE COORDINATE SYSTEM (ICOORDS) data element indicates which coordinate system is being used. The method of representing geospatial locations by coordinates is in a To Be Determined (TBD001) status pending establishment of a final standard by the Imagery Standards Management Committee/Geospatial Standards Management Committee (ISMC/GSMC). Until that determination has been made, this core set will allow coordinates to be expressed in either decimal degrees; degrees, minutes, and seconds; or ECEF cartesian. The preferred representation is decimal degrees.

Table 3-3

Frame Center Latitude
Frame Center Longitude
Frame Center LatLong
Frame Positional Accuracy
Sensor Latitude
Sensor Longitude
Sensor LatLong
Sensor Altitude
Sensor X Dimension
Sensor Y Dimension
Sensor Z Dimension

The following elements were added for video unique needs or information required to perform further processing activities.

Table 3-4

Focal Length
Field of View
Product Start Time
Sensor Model
Sensor Roll Angle
Slant Range
Video Time Stamp

3.3 Elements Mapped to the NIMA Metadata Model

DoD Directive 8320.1 directed its agencies to standardize data elements for use in DoD systems and established the Defense Data Dictionary System (DDDS) as the central repository. NIMA is responsible for elements pertaining to Mapping, Charting, Geodesy, and Imagery data. The NIMA model is an essential tool in this standardization process. The following table depicts the elements having a close if not exact relationship in description and function. Core Video Metadata elements with no related affiliate will be designated for inclusion in the model.

Table 3-5

<i>Core Video Metadata</i>	<i>NIMA Metadata Model</i>
Angle to North	IMAGE True North Angle
Classification	SECURITY CLASSIFICATION Code
Datum	HORIZONTAL-REFERENCE-DATUM Code
Image Category	SENSOR Category Code
Image Coordinate System	HORIZONTAL-COORDINATE-SYSTEM Code
Mission Number	
Obliquity Angle	IMAGE Obliquity Angle
Project ID Code	
Sensor Name	
Frame Center Latitude	
Frame Center Longitude	
Frame Center LatLong	
Frame Positional Accuracy	
Sensor Latitude	IMAGE-EXPLOITATION-SUPPORT-DATA Position Latitude
Sensor Longitude	IMAGE-EXPLOITATION-SUPPORT-DATA Position Longitude
Sensor LatLong	
Sensor Altitude	
Sensor X Dimension	Sensor X Dimension
Sensor Y Dimension	Sensor Y Dimension
Sensor Z Dimension	Sensor Z Dimension
Focal Length	IMAGE Focal Length Dimension
Field of View	
Product Start Time	IMAGE-EXPLOITATION-SUPPORT-DATA Time
Sensor Model	
Sensor Roll Angle	IMAGE-EXPLOITATION-SUPPORT-DATA Attitude Omega Angle
Slant Range	
Video Time Stamp	

4. ACRONYMS AND ABBREVIATIONS

CIO	Central Imagery Office
DARO	Defense Airborne Reconnaissance Office
DIGEST	Digital Geographic Information Exchange Standard
DoD	Department of Defense
EARS	Exploitation and Reporting Structure
ECEF	Earth Centered Earth Fixed
ESD	Exploitation Support Data
GMT	Greenwich Mean Time
GSMC	Geospatial Standards Management Committee
ISMC	Imagery Standards Management Committee
MSL	Mean Sea Level
NIMA	National Imagery and Mapping Agency
NITF	National Imagery Transmission Format
NITFS	National Imagery Transmission Format Standard
PIAE	Profile for Imagery Archive Extensions
RFC	Request for Change
SAR	Synthetic Aperture Radar
SDE	Support Data Extensions
SPIA	Standard Profile for Imagery Access
TEM	Technical Exchange Meeting
USIS	United States Imagery System
USIGS	United States Imagery and Geospatial Information System
UTM	Universal Transverse Mercator
VMG	Video Metadata Group
VTC	Video teleconferencing
VWG	Video Working Group